



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/586,518	06/02/2000	Michael R. Bruce	AMDA.455PA	5747

7590
Crawford PLLC
1270 Northland Drive
Suite 390
ST. Paul, MN 55120

05/06/2003

EXAMINER

MOHAMED, CHARIOUI

ART UNIT PAPER NUMBER

2857

DATE MAILED: 05/06/2003

Due: 7/06/03

Please find below and/or attached an Office communication concerning this application or proceeding.

Exhibit C

CRAWFORD PLLC
CLIENT REF. NO. TT3843
DATE SENT 5-15-03
INITIALS

Office Action Summary

Application No.

09/586,518

Applicant(s)

BRUCE ET AL.

Examiner

Mohamed Charioui

Art Unit

2857

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4,5 and 17 is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-16 and 18-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The proposed drawing are accepted by Examiner.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-3, 6-16 and 18-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Nikawa.

As per claim 1, Nikawa teaches a method for analyzing a semiconductor die having suspect circuitry that includes a multitude of circuit paths, using a state-changing operation of the suspect circuitry to cause a failure due to the suspect circuitry, identifying one of the circuit paths that electrically changes in response to heat and detecting that a particular circuit portion therein is resistive (see col. 4, lines 12-38 and col. 8, line 56 to col. 9, line 2).

As per claims 2, 3, 6-8, 11-14, 18, Nikawa further teaches heating at least a selected portion of state-changing circuitry in the semiconductor die to cause a failure due to suspect circuitry, the state-changing circuitry including a suspect signal path site (see col. 4, lines 12-38 and col. 8, line 56 to col. 9, line 2); detecting, in response to the selected portion being heated, a state-changing transition between a failed mode and a recovered mode in the suspect signal path site (see col. 15, line 46 to col. 16, line 38); using the detected state-changing transition, determining that the signal path site has a resistivity (i.e. change in current is proportional to the change in resistivity) that changes between the failed mode and the recovered mode (see col. 16, lines 25-38; col. 2, lines 8-59; and Fig. 2).

As per claims 15 and 19, Nikawa further teaches using a scanning optical microscope (see col. 9, lines 45-60 and col. 10, lines 21-30).

As per claims 16, 20 and 21, Nikawa further teaches placing the die in a test arrangement adapted to electrically operate the die under selected operating conditions and to obtain a response from the die including the state-changing transition (see col. 8, line 46 to col. 9, line 45).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Nikawa in view of Yue et al.

Nikawa teaches the system as stated above except that identifying one of the circuit paths that electrically changes in response to heat includes detecting a change in a failure rate of the circuit path during a state-changing operation. Yue et al. teach this feature (see col. 5, lines 33-40 and col. 1, lines 32-46). It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate Yue et al.'s teaching into Nikawa's invention, because the detection of change in failure rate during a state-changing operation would determine if the failure rate increase or decreases during that state-changing operation and therefore would indicate defects in the die.

4. **Claims 10, 22 and 23** is rejected under 35 U.S.C. 103(a) as being unpatentable over Nikawa in view of Paniccia et al.

As per claim 10, Nikawa teaches the system as stated above except for thinning the die prior to the heating. Paniccia et al. teach this feature (see col. 5, lines 7-23). It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate Paniccia et al.'s teaching into Nikawa's invention, because thinning the die would increase the transmission of the laser beam into the die; therefore, the current varies as well as the resistivity which determine the presence of a failure in the die.

As per claims 22 and 23, Nikawa teaches the system as stated above except for a photodetector adapted to detect reflected light from the die as it is scanned with

Art Unit: 2857

the laser and to provide a signal representing the detected light to the display. Paniccia et al. teach this feature (see col. 6, lines 38-65). It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate Paniccia et al.'s teaching into Nikawa's invention, because it would detect a change in the reflected light that leads to a change in voltage and current in the die and consequently a change of resistivity would be detected.

Allowable Subject Matter

5. **Claims 4, 5 and 17** are allowed.

The following is a statement of reasons for the indication of allowable subject matter: none of the prior art of record teaches or suggests electrically operating the die in a loop that causes the die to fail at a selected failure rate.

Response to Arguments

6. Applicant's arguments filed 2/14/03 have been fully considered but they are not persuasive.

Applicant argues that the present invention, as claimed, includes limitations directed to identifying the specific circuit paths that electrically change in response to heat and detecting that a particular circuit portion therein is resistive -- using a state-changing operation of a suspect circuit to cause its failure. The '407 reference does not use a state-changing operation of a suspect circuit to cause its failure, as claimed.

Examiner sees that '407 reference teaches identifying the specific circuit paths (i.e. wiring) that electrically change (i.e. variation in the current) in response to heat and

Art Unit: 2857

detecting that a particular circuit portion therein is resistive (i.e. local heating of the wiring produces the variation in resistance) (see col. 4, lines 12-38). Furthermore; Examiner sees that '407 reference teaches uses a state-changing operation of a suspect circuit to cause its failure, where state-changing operation of a suspect circuit is the current variation after the suspect circuit (i.e. wiring) is being heated (see col. 4, lines 12-38 and col. 4, lines 57-67).

Applicant argues that '407 reference does not teach state-changing transitions between failed and recovered modes.

Examiner sees that state-changing transitions between failed and recovered modes is inherently taught in the '407 reference, because heating the suspect circuit, the wire would expand; therefore, if wire was not perfectly connected, heating would expand the wire and the current would run through it, the wire resistivity would also change and this is considered to be the state-changing transitions between failed and recovered modes.

Applicant argues that first thinning the die the die will be destroyed before it can be determined that the die is defective.

Applicant did not provide any explanation on how the die would be destroyed after thinning it; therefore, Examiner sees that the rejection is proper and maintains it.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

Art Unit: 2857

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact information

8 - Any inquiry concerning this communication from examiner should be directed to Mohamed Charioui whose telephone number is 703 605-4362. The examiner can normally be reached Monday to Friday 9 am to 6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached at 703 308-1677. The fax phone number for the organization where this application is assigned is 703 305-3431.

Any inquiry of a general nature or relating to the status of this application should be directed to the group receptionist whose number is 703 308-0956.

Mohamed Charioui

5/2/03


MARC S. HOFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800